

1971 OPERATING
SUMMARY

SAULT STE. MARIE

WATER POLLUTION CONTROL PLANT



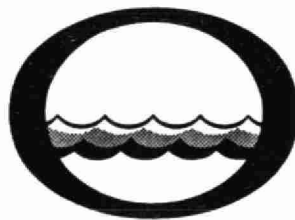
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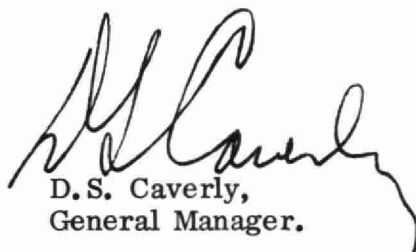


Water management in Ontario


Ontario
Water Resources
Commission

We are pleased to submit for your consideration a summary of operation during 1971 of the water pollution control plant serving your community.

This operating summary contains parameters normally used to measure plant performance and loading, as well as relevant cost data. Because of the concern over eutrophication of our lakes and of the requirement, in many parts of Ontario, to remove the major contributing factor, results of analysis for phosphorus appear in this summary.



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General Manager.



D.A. McTavish, P. Eng.,
Director,
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Toronto 195

SAULT STE. MARIE
WATER POLLUTION CONTROL PLANT

operated for

THE CITY OF SAULT STE. MARIE

by the

ONTARIO WATER RESOURCES COMMISSION

1971 ANNUAL OPERATING SUMMARY

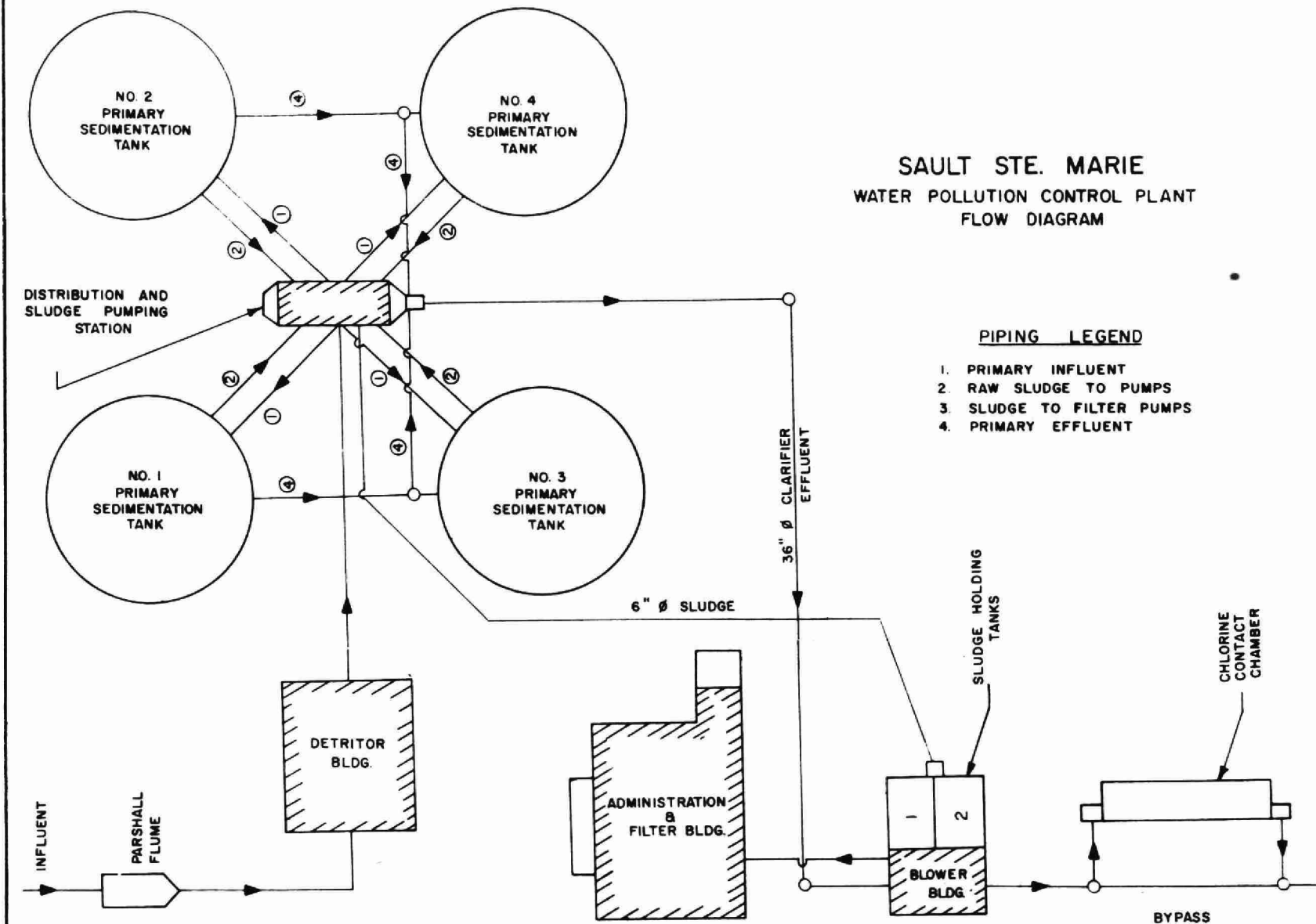
CONTENTS

Title Page	. . . . .	1
Flow Diagram	. . . . .	4
Design Data	. . . . .	5
'71 Review	. . . . .	6
Project Costs	. . . . .	8
Process Data	. . . . .	12

SAULT STE. MARIE WATER POLLUTION CONTROL PLANT FLOW DIAGRAM

PIPING LEGEND

1. PRIMARY INFLUENT
2. RAW SLUDGE TO PUMPS
3. SLUDGE TO FILTER PUMPS
4. PRIMARY EFFLUENT



DESIGN DATA

PROJECT NO. 2-0020-58

TREATMENT Primary

DESIGN FLOW 8.0 mgd

DESIGN POPULATION 72,500

BOD - Raw Sewage 250 mg/l
- Removal 35%

SS - Raw Sewage 200 mg/l
- Removal 60%

PRIMARY TREATMENT

Comminution

Type: Barminutor
Size: Two Model C (36")

Grit Removal

Type: Dorr detritor
Size: Two 18' x 18' x 1'3"
(6,240 gal)
Retention: 1.13 min
Flow Velocity: 0.209 fps

Primary Sedimentation

Type: Dorr
Size: Four 70' dia x 8' swd
(900,000 gal)
Retention: 2.3 hr
Loading: Surface, 520 gal/ft²/day
Weir, 13,000 gal/ft/day

CHLORINATION

Type: W & T
Size: One 800 lb/day

Chlorine Contact Chamber

Size: One 60' x 20' x 12'
Reten (90,000 gal)
Retention: 16.2 min

OUTFALL

- to St. Mary's River

SLUDGE HANDLING

Holding Tank - Aerated

Size: Two 24' x 15' x 11½'
(8,280 cu ft or 51,600 gal)
Air Supply: One Sutorbilt

Vacuum Filter

Type: Komline-Sanderson
Size: Two 200 sq ft

PUMPING STATIONS

Pim Street Pumping Station

Type: Worthington
Size: One 10,000 gpm @ 50' tdh
(diesel)
Two 6,300 gpm @ 40' tdh
(electric)

Clark Creek Pumping Station

Type: Worthington
Size: One 12320 gpm (electric)
One 13000 gpm (diesel)
Two 7000 gpm (electric)
One diesel generator

Wiita Pumping Station (Temporary)

Type: Smart-Turner
Size: 2400 gpm @ 30' tdh (electrical)

'71 Review

GENERAL

The plant was well operated during the year despite the rather high flows. Engineering design is underway to enlarge the plant by 50 percent.

Odours at the Clark Street pumping station are being dispersed by a specially designed stack which also serves as a flagpole.

A report is forthcoming regarding expansion of the Pim Street pumping station to minimize overflows at Pim Street.

PLANT FLOWS and CHLORINATION

A total of 3,423 million gallons were received in 1971 at an average daily flow of 9.4 million gallons. This represents 117 percent of the design flow of 8.0 million gallons per day. The average daily flow exceeded the design flow 78 percent of the time.

A total of 168,500 pounds of chlorine was applied at an average dosage of 4.9 mg/l throughout the year.

PLANT EFFICIENCY

The raw BOD averaged 105 mg/l while the influent suspended solids averaged 121 mg/l.

The BOD and suspended solids removal averaged 28 percent and 57 percent respectively.

VACUUM FILTRATION

The total solids concentration in the filtered sludge was 25.3 percent. The amount of sludge applied to the filters was 7,740,000 gallons.

Conditioning chemicals were not used throughout the year and an excellent filter yield of 9.6 pounds per square foot per hour was realized.

CONCLUSIONS

The water pollution control plant and pumping stations were operated efficiently during the past year. It is expected that the forthcoming enlargement will improve plant performance during peak flows.

PROJECT COSTS

2-0020-58	
NET CAPITAL COST (Final)	\$3, 244, 149.35
DEDUCT - Portion financed by CMHC/MDLB (Final)	<u>2, 148, 472.61</u>
Long Term Debt to OWRC	<u>\$1, 095, 676.74</u>
Debt Retirement Balance at Credit (Sinking Fund) December 31, 1971	\$ <u>289, 471.55</u>
Net Operating	\$ 169, 746.74
Debt Retirement	10, 335.00
Reserve	14, 721.79
Interest Charged	<u>61, 457.41</u>
TOTAL	\$ <u>256, 260.94</u>

RESERVE ACCOUNT

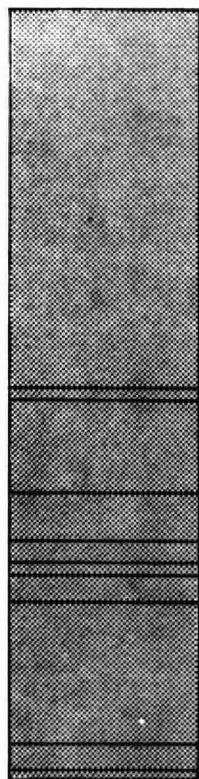
Balance @ January 1, 1971	\$ 159, 558.16
Deposited by Municipality	14, 721.79
Interest Earned	<u>10, 668.07</u>
	\$ 184, 948.02
Less Expenditures	<u>5, 684.30</u>
Balance @ December 31, 1971	\$ <u>179, 263.72</u>

PROJECT COSTS

2-0210-66	
NET CAPITAL COST (Final)	\$102,395.13
DEDUCT - Portion financed by CMHC/MDLB (Final)	<u>98,707.07</u>
Long Term Debt to OWRC	\$ <u>3,688.06</u>
Debt Retirement Balance at Credit (Sinking Fund) December 31, 1971	\$ <u>290.71</u>
Net Operating	\$ -
Debt Retirement	107.00
Reserve	1,258.19
Interest Charged	<u>272.52</u>
TOTAL	\$ <u>1,637.71</u>

RESERVE ACCOUNT

Balance @ January 1, 1971	\$ 2,211.81
Deposited by Municipality	1,258.19
Interest Earned	<u>175.13</u>
	\$ 3,645.13
Less Expenditures	<u>-</u>
Balance @ December 31, 1971	\$ <u>3,645.13</u>



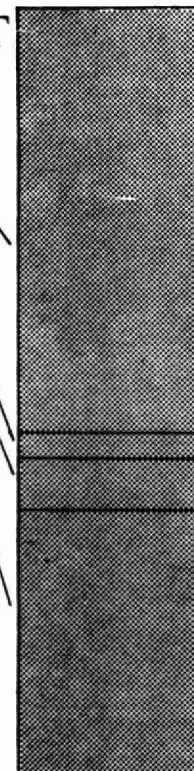
OPERATING COSTS

● PAYROLL	51 %
● FUEL	1 %
● POWER	13 %
● CHEMICALS	7 %
● GENERAL SUPPLIES	2 %
● EQUIPMENT	< 1 %
● REPAIRS & MAINTENANCE	3 %
● SUNDRY	18 %
● WATER	4 %
● TRAVEL	< 1 %

1971 COSTS

TOTAL ANNUAL COST

NET OPERATING	66 %
DEBT RETIREMENT	4 %
RESERVE	6 %
INTEREST	24 %



YEARLY OPERATING COSTS

YEAR	SEWAGE TREATED in million gallons	TOTAL OPERATING COSTS	TREATMENT COSTS	
			\$ per million gal	¢ per lb BOD
1967	2796.57	\$135,741.58	\$48.54	17 cents
1968	3196.10	136,641.46	42.75	14 cents
1969	3162.70	146,194.04	46.22	11 cents
1970	3107.00	162,677.59	52.30	17 cents
1971	3423.6	169,746.74	49.60	16 cents

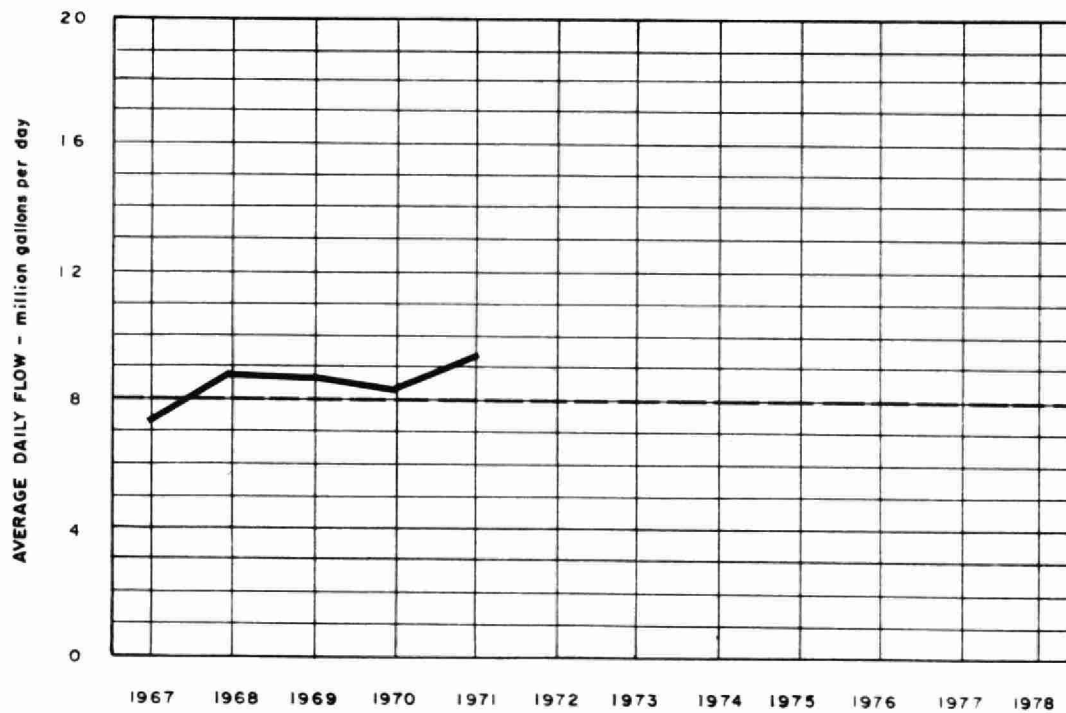
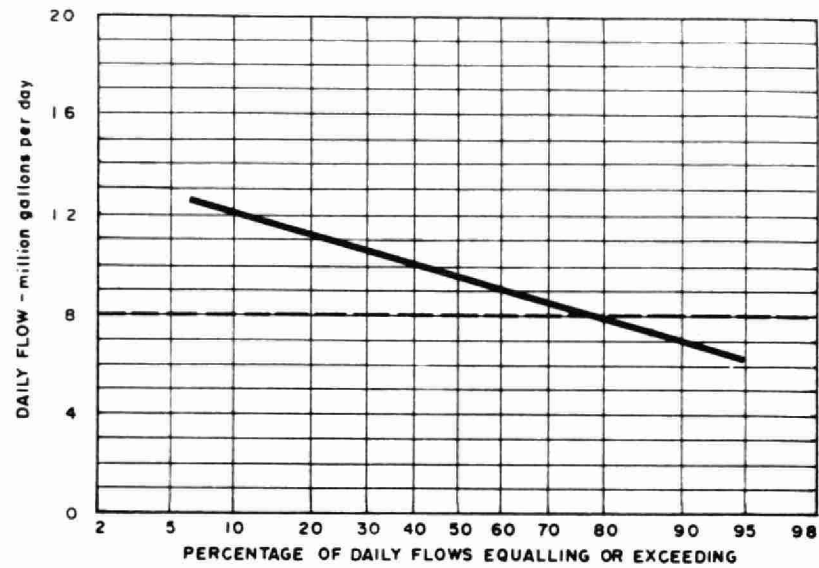
MONTHLY OPERATING COSTS

MONTH	TOTAL EXPENDITURE	REGULAR PAYROLL	CASUAL PAYROLL	FUEL	POWER	CHEMICALS	GENERAL SUPPLIES	EQUIPMENT	REPAIRS and MAINTENANCE	SUNDRY*	WATER	TRAVEL
JAN	7889.54	6110.25	-	-	-	-	139.61	-	243.67	1113.75	282.26	-
FEB	17598.41	9109.83	-	393.49	2870.95	2197.65	573.05	-	482.34	1341.90	629.20	-
MAR	12411.83	6109.45	-	349.80	3274.60	-	394.82	-	250.19	1382.84	650.13	-
APR	12069.17	6177.50	-	458.33	70.56	2197.65	39.30	-	962.07	1423.25	680.51	60.00
MAY	8674.98	6054.93	598.76	189.70	673.31	-	344.94	(385.26)	529.32	98.86	502.81	67.61
JUNE	25805.15	5933.32	(598.76)	-	3040.92	2223.00	257.25	-	198.84	14334.37	416.21	-
JULY	9404.60	5943.26	599.96	-	666.32	-	145.33	19.35	(9.32)	1507.03	504.83	27.84
AUG	12024.25	6213.18	717.96	-	4390.98	-	269.94	-	27.63	-	404.56	-
SEPT	14753.05	6014.34	100.16	-		2052.00	296.55	364.56	1059.51	4535.81	340.12	-
OCT	17250.00	10899.49	-	285.96	2994.79	2052.00	211.76	-	91.60	138.56	540.96	34.88
NOV	12489.00	8408.16	-	-	1907.94	-	96.79	-	128.97	1410.33	463.31	73.50
DEC	19376.76	9864.79	-	538.19	2129.90	1772.06	1149.13	-	348.99	2706.48	840.98	26.24
TOTAL	169746.74	86838.50	1418.08	2215.47	22020.27	12494.36	3908.47	(1.35)	4313.81	29993.18	6255.88	290.07

Brackets indicate credit.

* Sundry includes sludge haulage costs of \$14,519.75

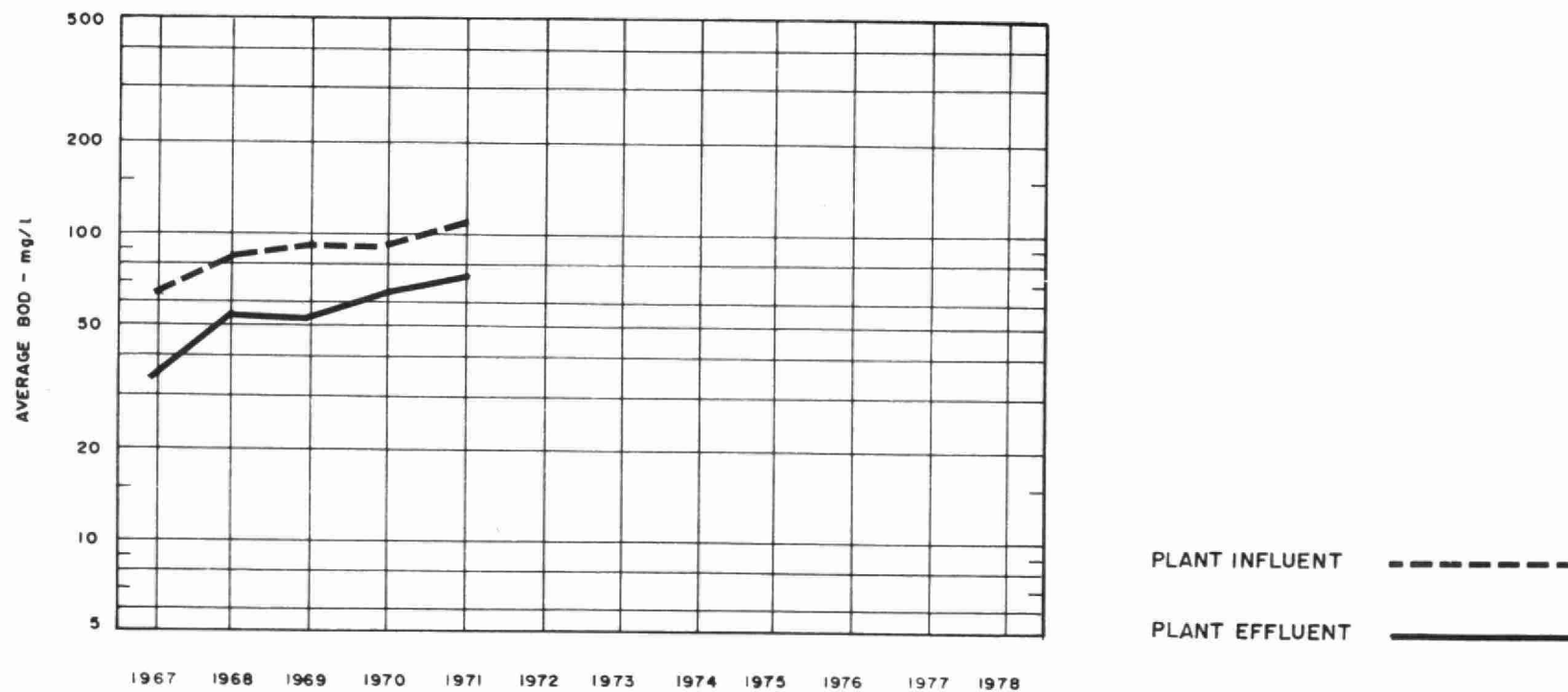
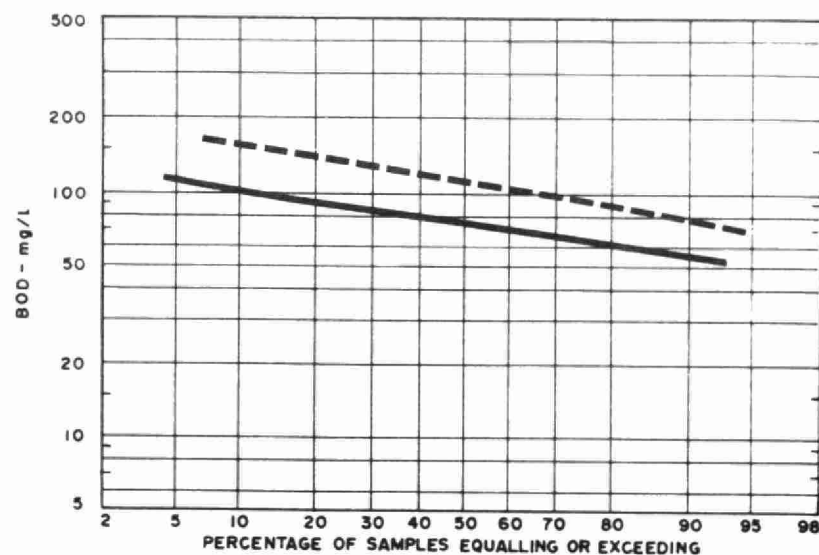
PROCESS DATA FLOWS



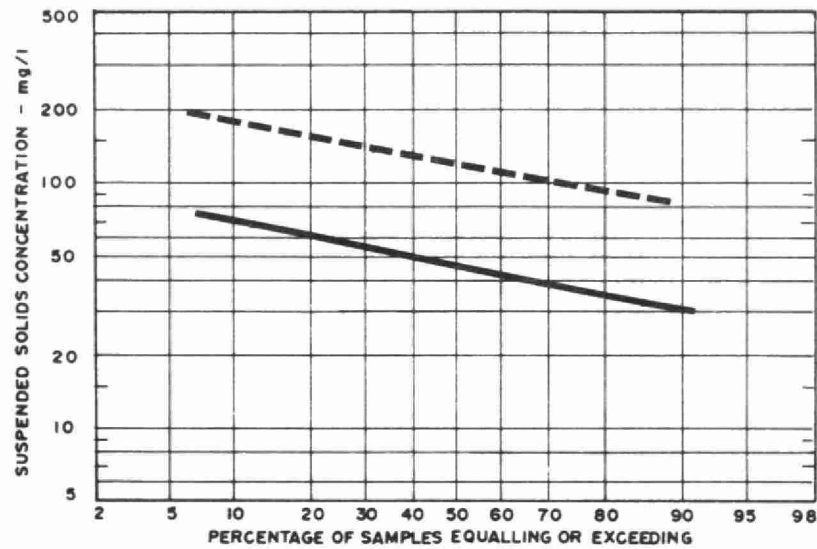
PLANT PERFORMANCE

MONTH	FLOWS				BIOCHEMICAL OXYGEN DEMAND				SUSPENDED SOLIDS				TOTAL PHOSPHORUS		
	TOTAL FLOW	AVERAGE DAY	MAXIMUM DAY	MAXIMUM RATE	INFLUENT	EFFLUENT	REDUCTION		INFLUENT	EFFLUENT	REDUCTION		INFLUENT	EFFLUENT	REDU
	million gallons	mil gal	mil gal	mgd	mg/l	mg/l	%	10 ³ pounds	mg/l	mg/l	%	10 ³ pounds	mg/l as P	mg/l as P	%
JAN	227.6	7.3	10.8	17	128	85	34	98	127	49	61	278	7.8	6.5	17
FEB	208.1	7.4	11.5	13	114	105	8	19	118	45	62	152	4.7	4.7	0
MAR	304.2	9.8	15.9	18	86	65	36	64	88	46	48	128	-	-	-
APR	383.1	12.8	18.6	27	107	77	28	115	95	43	55	199	5.6	5.5	2
MAY	279.5	9.0	11.3	17	107	65	39	117	131	55	58	213	5.9	4.7	20
JUNE	264.7	8.8	11.5	19	112	78	30	90	133	59	56	196	5.8	6.8	0
JULY	272.3	8.8	13.4	17	85	55	35	82	119	52	56	182	8.5	3.0	64
AUG	277.1	8.9	11.1	15	103	75	27	78	125	48	62	213	4.6	4.0	13
SEPT	273.1	9.1	12.6	20	97	65	33	87	123	55	55	186	7.2	5.8	19
OCT	328.0	10.6	14.6	16	115	71	38	144	126	54	57	236	7.6	5.6	26
NOV	313.1	10.4	18.3	23	111	72	35	122	122	49	60	229	-	-	-
DEC	292.8	9.4	16.9	28	94	69	27	73	137	57	48	234	4.8	4.3	10
TOTAL	3423.6	-	-	-	-	-	-	1089	-	-	-	2446	-	-	-
AVG.	-	9.4	MAXIMUM 18.6	MAXIMUM 28	105	76	28	91	121	51	57	204	6.3	5.1	19
No. of Samples	-	-	-	-	62	62	-	-	64	64	-	-	10	10	-

BIOCHEMICAL OXYGEN DEMAND

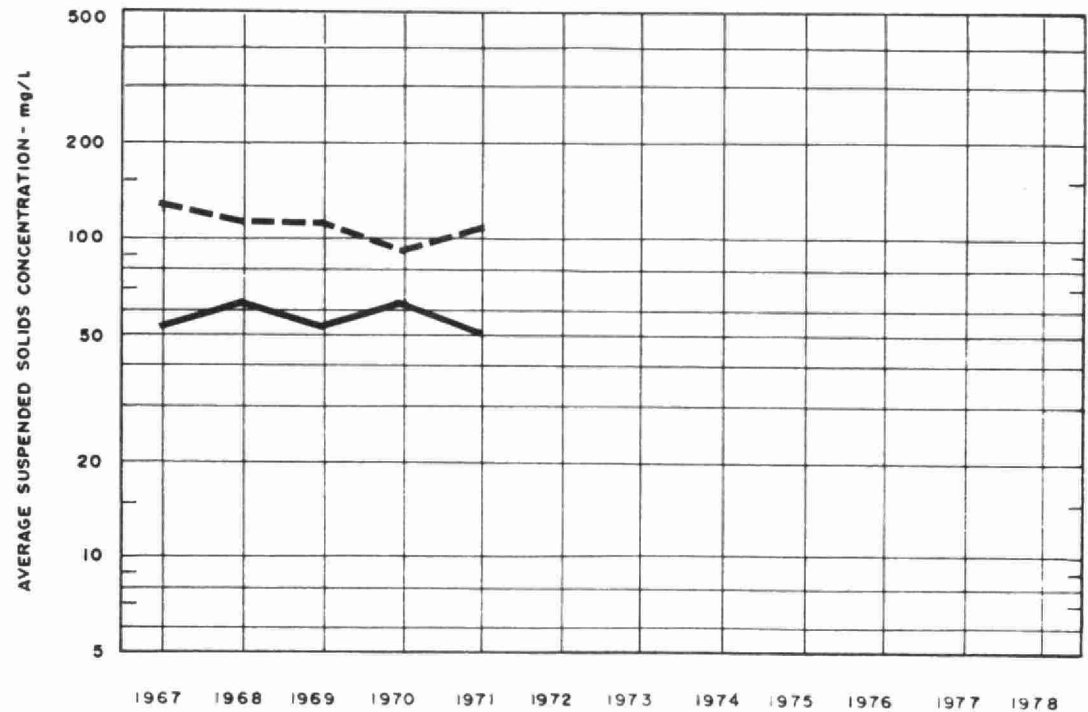


SUSPENDED SOLIDS

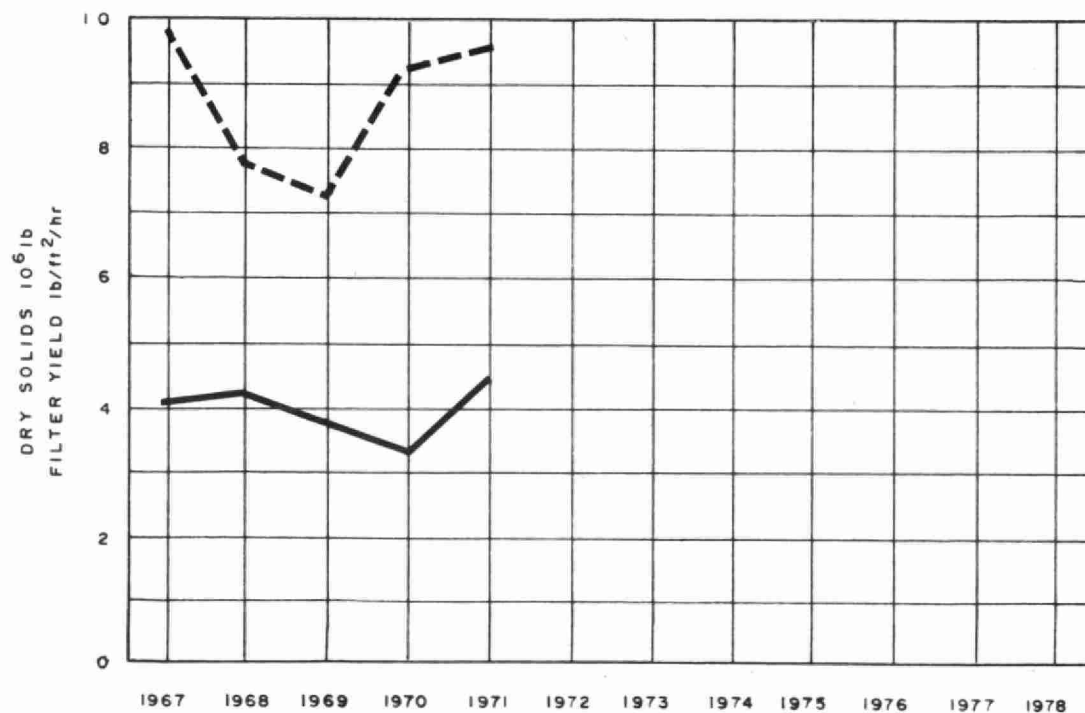
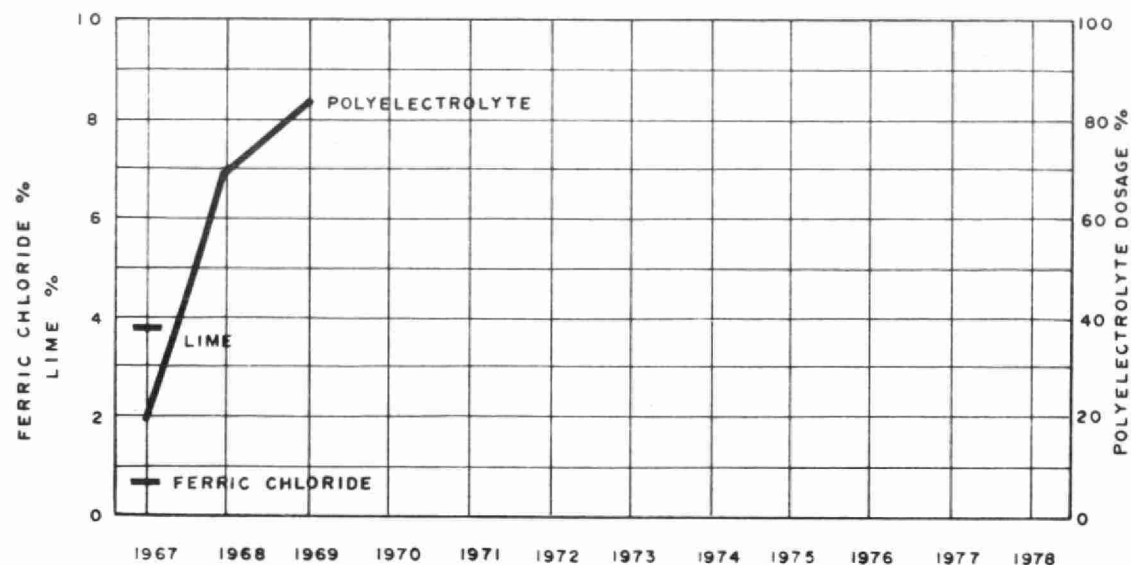


PLANT INFLUENT - - - - -

PLANT EFFLUENT _____



VACUUM FILTRATION



TREATMENT DATA

MONTH	GRIT	CHLORINATION		VACUUM FILTER OPERATION									
	QUANTITY REMOVED cubic feet	CL ₂ USED 10 ³ pounds	AVG. DOSE mg/l	TOTAL FILTER HOURS	SLUDGE TO FILTERS			CHEMICALS USED			YIELD lb/ft ² /hr	FILTER CAKE % T.S.	SLUDGE HAULED cu. yards
					QUANTITY 10 ⁵ gal.	TOTAL SOLIDS %	DRY SOLIDS 10 ⁵ pounds	LIME as CaO lb	FeCl ₃ lb	POLY- lb			
JAN	196	11.9	5.2	224	7.5	5.1	3.8	0	0	0	8.3	24.0	659
FEB	85	11.0	5.3	200	6.7	5.0	3.4	0	0	0	8.2	21.7	588
MAR	150	13.4	4.4	200	6.9	5.4	3.7	0	0	0	9.1	25.2	701
APR	158	13.4	3.4	162	5.6	5.4	3.0	0	0	0	9.0	25.5	627
MAY	200	13.2	4.7	186	6.7	6.1	4.2	0	0	0	11.0	27.1	713
JUNE	165	13.9	5.1	193	6.8	6.0	3.9	0	0	0	10.5	24.8	705
JULY	118	16.0	5.8	171	5.9	5.9	3.5	0	0	0	10.1	25.0	653
AUG	178	15.5	5.6	168	5.4	6.2	3.3	0	0	0	9.7	25.0	660
SEPT	193	16.0	5.8	182	6.2	6.0	3.8	0	0	0	10.2	26.3	720
OCT	179	13.7	4.2	164	5.6	6.0	3.4	0	0	0	10.1	25.8	610
NOV	140	15.3	4.9	204	7.0	5.8	4.2	0	0	0	10.0	26.9	807
DEC	209	15.2	5.2	196	7.1	5.5	3.9	0	0	0	9.6	26.1	802
TOTAL	1971	168.5	-	2250	77.4	-	44.2	0	0	0	-	-	8245
AVG.	0.6 cu. ft./mil gal.	14.0	4.9	187	6.5	5.7	3.7	0	0	0	9.6	25.3	687

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